National Institute of Environmental Health Sciences

Spatial prediction of malaria prevalence in an endemic area of Bangladesh

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Abstract:

Background: Malaria is a major public health burden in Southeastern Bangladesh, particularly in the Chittagong Hill Tracts region. Malaria is endemic in 13 districts of Bangladesh and the highest prevalence occurs in Khagrachari (15.47%). Methods: A risk map was developed and geographic risk factors identified using a Bayesian approach. The Bayesian geostatistical model was developed from previously identified individual and environmental covariates ($p < 0.2$; age, different forest types, elevation and economic status) for malaria prevalence using WinBUGS 1.4. Spatial correlation was estimated within a Bayesian framework based on a geostatistical model. The infection status (positives and negatives) was modeled using a Bernoulli distribution. Maps of the posterior distributions of predicted prevalence were developed in geographic information system (GIS). Results: Predicted high prevalence areas were located along the north-eastern areas, and central part of the study area. Low to moderate prevalence areas were predicted in the southwestern, southeastern and central regions. Individual age and nearness to fragmented forest were associated with malaria prevalence after adjusting the spatial auto-correlation. Conclusion: A Bayesian analytical approach using multiple enabling technologies (geographic information systems, global positioning systems, and remote sensing) provide a strategy to characterize spatial heterogeneity in malaria risk at a fine scale. Even in the most hyper endemic region of Bangladesh there is substantial spatial heterogeneity in risk. Areas that are predicted to be at high risk, based on the environment but that have not been reached by surveys are identified.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2878303

Resource Description

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Bangladesh

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children, Low Socioeconomic Status

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Short-Term (

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content